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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/471,071	12/21/1999	TONGBI JIANG	MICRON.110A	6968

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EXAMINER

CHAMBLISS, ALONZO

ART UNIT PAPER NUMBER

2814

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/471,071

Applicant(s)

JIANG, TONGBI

Examiner

Alonzo Chambliss

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-23 and 25-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-23 and 25-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 December 1999 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see remarks, filed 7/6/04, with respect to the rejection(s) of claim(s) 8-23 and 25-28 under 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Yamamoto et al. (U.S. 6,265,782, Ishikawa et al. (U.S. 5,248,853), Shie et al. (U.S. 6,746,896), and Shibara et al. (U.S. 5,166,228).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 8-23 and 25-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. (U.S. 6,265,782) in view of Shiobara et al. (U.S. 5,166,228), Shi et al. (U.S. 6,746,896, and Ishikawa et al. (U.S. 5,248,853).

With respect to Claims 8, 9, 11, 15-17, 19, 20-23, and 25-30, Yamamoto discloses a die 6, a die attach layer 1 (i.e. an epoxy resin and a curing agent) over the die, and an array of solder balls 9 over the die attach layer 1 or 3, wherein the die attach layer has modulus of elasticity of 600MPa – 700MPa (i.e. 87.02 ksi- 108.77ksi). A plurality of conductive terminals is on the substrate for electrically connecting the

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conductive terminals to the chip by the solder balls 9 and TAB leads 10. The compliant layer 1 (i.e. die attach layer) is between the chip 6 and the substrate made of polyimide. A flexible tape connects the array of solder balls to the die, wherein one end of the tap is located over the die attach layer, and another end of the tape is located over the die (see col. 1 lines 17-40, col. 20 lines 30-40 and col. 21 lines 1-20 and 54-63; Figs. 5 and 7F). Yamamoto fails to disclose the die attach layer that is an epoxy modified with an elastomeric material having a coefficient of thermal expansion of less than about 106 ppm/ $^{\circ}$ C. However, Shiobara discloses that it is well known in the semiconductor industry that an epoxy modified with an elastomeric material is a phenolic resin (see col. 6 lines 29-35). Furthermore, it is well known in the semiconductor industry that a phenolic resin has modulus of elasticity of 60kg/mm² (i.e. 85.3 ksi) as evident by Ishikawa (see col. 13 lines 1-7 and col. 14 lines 1-2) and it is also well known in the semiconductor industry that a epoxy modified with elastmeric material has a coefficient of thermal expansion of about 64 ppm/ $^{\circ}$ C as evident by Shi (see col. Table 2 line 7, col. 12 lines 38-56). Thus, Yamamoto and Shiobara have substantially the same environment of a material have roughly the same modulus of elasticity that used with a semiconductor device. Therefore, it would have been obvious to one skilled in the art at the time of the invention to substitute the phenolic resin for the die attach layer of Yamamoto, since the phenolic resin provides excellent adhesion, low moisture uptake, low CTE, and controllable curing characteristics as evident by Shiobara.

With respect to Claim 10, Yamamoto discloses the die attach layer 3 having a thickness of 127 micrometers (i.e. 5 mils) (see col. 16 lines 36-38).

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With respect to Claims 12-14 and 18, Yamamoto discloses a ball grid array, tape ball grid array, and micro ball grid array (see Figs. 5 and 7F).

The prior art made of record and not relied upon is cited primarily to show the product of the instant invention.

Conclusion

4. Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (571) 272-1927.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956.

AC/September 16, 2004

A handwritten signature in black ink, appearing to read "Alonzo Chambliss", with a stylized flourish at the end.

Alonzo Chambliss
Primary Patent Examiner
Art Unit 2827